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ABSTRACT

This study examined the reading progress under different teaching approaches of 89 children with diagnosed learning disabilities. The learning-disabled children were placed either in an experimental group that received reading instruction with materials that sequenced learning in increasingly complex levels (from letter-sound to word to context materials) or in a control group that received the type of instruction regularly provided learning-disabled children. After 16 months of instruction, the comparison of pretest and posttest reading scores showed that children in the experimental group demonstrated greater improvement in reading skills performance than children in the control group. (RL)

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THE EFFECT OF THE STRUCTURE OF MATERIALS ON THE DEVELOPMENT OF READING SKILLS IN DISABLED READERS

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Abstract

Investigation of the cognitive skills acquired by the child when learning to read have centered recently on the processes of identification of units and identification of relationships forming rules or generalizations which will allow for flexible recombinations of units (Gibson, 1970; Mackworth, 1971; Venezky & Calfee, 1970).

Results of recent studies (Barr, 1975; Biemiller, 1970; Weber, 1968) have provided support for the view that instructional materials and strategies have an influence on the ways that children identify and utilize these necessary units and relationships. In this view, the skill of the reader is determined by the extent to which he is able to establish a knowledge of units, to develop generalizations, and to apply them in novel reading situations. The child developing normally in reading skills is able to identify and to structure the hierarchies of generalizations independently to allow for application during reading. However, certain disabled learners with disorders in the basic processes of memory and conceptual thinking do not classify, order, and form relationships in the typical way (McCarthy & McCarthy, 1969). Therefore, although this type of learning disabled child may assimilate knowledge of units, he does not appear able to integrate and to apply the knowledge when reading.

What is needed is the identification of materials which will not only lead these disabled readers to the integrative assimilation of various

elements but also guide them in the structuring and use of the necessary relationships. This study is designed to help answer the question: "Can materials be structured for LD non-readers to provide for the development of appropriate phoneme-grapheme relationships and also provide for the application of this knowledge when reading?"

A total of 89 children identified as LD under local staffing requirements in 5 school districts were randomly assigned to experimental and control conditions at each location. Experimental children received instruction in materials which sequence learning in increasingly complex levels from letter-sound to word to context materials. A control group received the instruction regularly provided for LD children.

To provide answers to the questions, performance of the two groups will be compared on standardized measures of knowledge of phoneme-grapheme relationships, recognition of words, oral reading accuracy, and silent reading comprehension.

The Effect of the Structure of Materials on the Development of Reading Skills in Disabled Readers

Recent investigations of the cognitive skills acquired by the child when learning to read have centered on the processes of identifying units and relationships leading to formation of rules or generalizations which will allow for flexible recombinations of units (Gibson, 1970; Mackworth, 1971; Venezky & Calfee, 1970). For example, Gibson and Levin (1975) have suggested three facets to be considered in learning to read: 1) the process of identifying units which requires the child to attend to the graphic representation and to associate this with the meaning represented, a task which involves combining foci for attention; 2) the process of learning sound-symbol associations that link the spoken and written language systems, a task which involves identifying the consistent relationships within the inconsistencies of the phonological-graphological correspondences of English; and 3) the process of learning that the structures of words are related, a task which involves flexibly combining and applying knowledge of complex patterns when the pattern is encountered in varying settings (e.g. new words). In this view, the skill of the reader is determined by the extent to which he/she is able to establish a knowledge of units, to develop generalizations, and to apply them in novel reading situations.

The success demonstrated by readers in learning the processes which allow them to unlock the meaning of print varies widely among children. Some children appear to progress successfully under any instructional method

quickly learning phoneme-grapheme relationships and the significance of spelling patterns for word pronunciation and meaning associations. Others continue to have difficulty despite adequate intellectual ability and carefully planned instruction. While the child developing normally in reading skills is able to identify and to structure the hierarchies of generalizations independently to allow for application during reading, certain disabled learners with disorders in the basic processes of memory and conceptual thinking do not classify, order, and form relationships in the typical way (McCarthy & McCarthy, 1969). Learning disabled children often display problems in attention, in integrating elements into complex relationships, and in flexibly manipulating known elements. Therefore, although this type of learning disabled child may assimilate knowledge of units, he/she does not appear to be able to integrate and to apply this knowledge when reading.

Explanations for this difference have emphasized a possible causal relationship between the nature of the instruction and the learning style of the child. Results of recent studies (Barr, 1975; Biemiller, 1970; Weber, 1968) have provided support for the view that instructional materials and strategies have an influence in the ways that children identify and utilize these necessary units and relationships. The degree to which instructional method and material match the attention, learning, and processing style of a child will determine his/her rate of success in learning the complex process of reading.

Instructional materials developed for disabled learners often provide for initial success in reading through procedures which: 1) guide the attention of the child to the unit; 2) develop knowledge of the unit

through active interaction by the learner; 3) build retention through varied practice; and 4) allow the child's success to set the rate of instruction.

These procedures help the learning disabled child assimilate knowledge of units and provide practice in textual reading with the hope that the child will automatically apply generalizations to novel reading situations. This approach omits guidance in one important area where LD children have difficulty, that is, in generalizing the task of determining significant cues and flexibly attempting alternative relationships among these cues within the total reading context. What is needed, then, are materials which not only lead these disabled readers to attend to significant features and help them assimilate various elements but also guide the learners to the structure and use of necessary relationships. This study represents an attempt to identify such instructional materials.

This study is based on data from an evaluation of the Oralographic Reading Program (OR) (Kobler & Kobler, in press), a system of instruction containing features which would appear to provide for the specific learning needs described above. The OR program provides for sequential development in identifying single letter-sound relations and spelling pattern-sound relations within the context of whole words, accompanied by planned application of learned elements to novel reading contexts.

Each lesson provides for practice in identification of units learned and then extended or applied reading in a story composed of learned words and new words requiring minimal recombinations. Content extends from single grapheme-phoneme components to complex spelling patterns.

The identification tasks are developed through multisensory interaction of visualizing, hearing, speaking, and writing. Program materials include printed sheets, the Talking Page, and the Voice Mirror. The Talking Page allows coordination of printed materials with sound discs which provide directions, oral cues, and verification of responses. The Voice Mirror allows the child to match personal responses to model responses on the sound discs. The pages also provide graphic presentation of words practiced. The child is able to select learning tasks, repeating any task if necessary. Guidance is provided to help children remain on task, to provide reinforcement, and to interact in discussions of the reading content.

This study is based on the reading progress demonstrated by 89 disabled readers from school districts in five cities. Each of these school districts follows a formal procedure for identifying and diagnosing disabled learners. The population of this study was drawn from these disabled learners in the following manner: after identification as disabled learners, all children completed four subtests of the Gates-McKillop Diagnostic Reading Tests (Oral Reading, Words Flashed, Words Untimed, Common Word Parts) and both subtests of the Gates-MacGinitie Reading Test, Level A (Vocabulary, Comprehension). All children scoring above a composite grade equivalent of 2.0 and not scoring below expectancy for their age and grade were removed from the population for this study. The remainder of the children were then randomly assigned to experimental and control groups at each location. All children in the experimental group received reading instruction using the materials and procedures of the Oralographic Reading Program. They received no other direct instruction in reading.

Children in the control group received the specialized reading instruction at each location which is regularly provided in programs for disabled learners. These children received daily individual or small group instruction, characterized by language experience activities, reteaching basal reader materials, auditory training, and phonics skill instruction.

Children in the experimental group were allowed to continue working in the OR program until all 60 lessons were completed. The time span for completion of the program extended from 7 months to 16 months of schooling. The program began approximately mid-year of 1975-76, and instruction for some children at one location extended into the 1976-77 school year. Upon completion of the OR program, each experimental child and a child from the control group were retested on the Gates-McKillop and Gates-MacGinitie Tests. Therefore, the instructional period for children from each of the groups is equal. For the purposes of this study, any unusual discrepancy between the progress of children in the two groups represents an effect of the instructional method.

All post-test standard scores were equated to the February norms for Level A of the Gates-MacGinitie Tests. In effect, this procedure provides a measure of absolute difference between pre- and post-test scores. The four subtests from the Gates-McKillop Reading Diagnostic Tests each yield grade equivalent scores only. The Gates-MacGinitie standard scores and the Gates-McKillop grade scores were used in the analysis. An analysis of covariance was used to test the significance of differences between groups on each test.

It has been observed that instruction in reading for LD children tends to result in increased scores in word attack skills at a level that is not matched by increases in comprehension. It may be assumed that a generic ability in identifying cues and flexibly applying this information during reading applies to units in comprehension as well as word identification. Therefore, effective instructional materials would result in an increase in comprehension as well as in word recognition skills. To determine this effectiveness, a ratio of the relationship between word attack and comprehension scores for each group was determined.

The specific hypotheses of this study are:

1. Learning disabled remedial readers who receive OR instruction will demonstrate more progress in reading than learning disabled remedial readers who receive the typical specialized instruction in reading.

2. Learning disabled remedial readers who receive OR instruction will demonstrate more comparable growth in word attack and comprehension skills, as measured by a ratio, than learning disabled remedial readers who receive typical specialized instruction in reading.

Results

Results of the analysis of covariance support the first hypothesis that experimental children realized greater progress in reading than children in the control group on all six reading measures.

Insert Table 1 about here

Probabilities related to *F* scores ranged from .001 to .004. The mean standard scores on the Gates-MacGinitie Vocabulary Test are 63.35 for the

experimental group and 58.63 for the control group. Grade equivalents yielded by these standard scores are 2.3 and 1.8. Mean standard scores on the Gates-MacGinitie Comprehension Test for the two groups are 62.44 and 52.59, represented by grade equivalents of 2.2 and 1.7. On the four Gates-McKillop Tests, mean grade equivalents ranged from 3.0 to 4.3 for the experimental group, and from 2.6 to 2.9 for the control group.

Insert Table 2 about here

These results demonstrate that learning disabled children receiving instruction through the OR program realized significantly greater progress in reading than children receiving reading instruction in the learning disability programs at these five locations.

Disabled readers may succeed in identification of cues such as phonic elements or sight words, but continue to have difficulty in applying this knowledge to the total reading situation. The second hypothesis states that children receiving OR instruction will be able to develop flexibility in selecting alternative cues, and to generalize this skill to comprehension in the total reading task, to a greater extent than children in the control group. If children are able to generalize the skill, then performance in comprehension should approximate the level of performance in word attack skills. The degree to which progress in the two areas is similar may be expressed by a ratio, arbitrarily assigning a measure of word attack as the denominator and the measure of comprehension as the numerator. A ratio closer to 1 then represents equivalent performance in the two areas, while

a lower ratio represents performance in comprehension at a lower level than performance in word attack.

A comparison of the ratio's thus formed between experimental and control groups would reveal an interesting difference in relative performance on word attack and comprehension.

Using gain scores from the tests Words Flashed and Words Untimed as measures of word attack, and gain scores on the Gates-MacGinitie Comprehension Test reveals ratios of .70 and .63 for the OR group, and .14 and .16 for the control group.

Insert Table 3 about here

These ratio's appear to support the hypothesis that the experimental children were able to maintain performance in the total reading act to a greater degree than children in the control group. This outcome is interpreted as an indication of increased ability by the experimental children in manipulating both word attack and comprehension cues, providing greater total reading ability.

Alternative explanations are, of course, available. The increased skills in comprehension may be due in part to increased speed in decoding, freeing the memory to operate more on meaning cues, a possibility noted by Perfetti (1977). Also, the fact that the experimental children did not reach as great a level in comprehension as they did in word attack indicates the need for additional changes in instruction to provide for such areas as knowledge of word meanings and processing of linguistic units.

Additional research is needed to discriminate between the effects of flexibility in cue search techniques, and other factors unique to the processing styles of learning disabled children.

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Table 1

Summary of Post-Test Means and Significance Levels from Analysis of Covariance for Experimental and Control Groups on Six Reading Tests

	Post-Test Standard Score and Grade Equivalent Means			
	N=45	N=44		
Test	Experimental	Control	F	Probability
Vocabulary	63.35	58.63	12.18	.001
Comprehension	62.44	52.59	11.80	.001
Oral Reading	3.2	2.7	10.51	.002
Words Flashed	3.0	2.6	8.73	.004
Words Untimed	3.2	2.8	19.05	.001
Word Parts	4.3	2.9	37.19	.001

Table 2

A Comparison of Grade Equivalents Between Experimental and Control Children on Six Reading Tests

	Raw Grade Equivalent					
	Experimental		Control		Gain*	
Test	Pre	Post	Pre	Post	Experimental	Control
Vocabulary	1.6	2.3	1.6	1.8	.7	.2
Comprehension	1.5	2.2	1.6	1.7	.7	.1
Oral Reading	1.8	3.2	1.9	2.7	1.4	.8
Words Flashed	2.0	3.0	2.0	2.7	1.0	.7
Words Untimed	2.2	3.3	2.2	2.8	1.1	.6
Word Parts	2.0	4.3	2.3	2.9	2.3	.7

*.1 = 1 month

Table 3

A Comparison of Comprehension/Word Attack Ratios

	Experimental		Control	
Measures	Gain Score	Ratio	Gain Score	Ratio
Comprehension	.7	.70	.1	.14
Words Flashed	1.0		.7	
Comprehension	.7	.63	.1	.16
Words Untimed	1.1		.6	